

**UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF VIRGINIA**

UMG RECORDINGS, INC., *et al.*,

*Plaintiffs,*

v.

KURBANOV, *et al.*,

*Defendants.*

Case No. 1:18-cv-00957-CMH-TCB

**DECLARATION OF ROBERT W. SCHUMANN**

1. I, Robert W. Schumann, hereby declare pursuant to 28 U.S.C. § 1746 that the statements below are true and correct to the best of my personal knowledge and belief.

2. I have knowledge of the facts set forth herein based on my personal knowledge or documents and information reviewed in connection with this case and, if necessary, I would and could competently testify thereto if called as a witness in this matter.

3. I have been asked by Plaintiffs to provide a technical explanation of the websites located at the web addresses <https://www.flvto.biz> (the “FLVTO Site”) and <https://www.2conv.com> (the “2conv Site” and together with the FLVTO Site, “Defendant’s Websites” or “Websites”), including how they are designed and operate in use, the processes by which they rip audio files from YouTube streaming videos, and the domain names. I also provide a technical overview of the mechanisms by which YouTube protects its streamed content.

4. I previously submitted an expert declaration dated June 16, 2021 for a motion to compel Defendant to preserve and produce web server data, which I understand the Court

granted. I also previously provided an expert report in this case dated June 18, 2021, to which I understand Defendant did not provide a responsive expert report.

### ***Qualifications***

5. I have worked in the computer and technology industry for the past 36 years. In 1985, I received a Bachelor of Science in Computer Science from Rochester Institute of Technology. Since that time, I have worked in various facets of the computer industry, in connection with the design and development of computer software, computer networking systems, computer automation, consumer electronics, large-scale database processing, drone accessories, physical and electronic audio/video distribution systems, digital security, and other content-protection systems. I also have been personally involved in and overseen the development and licensing of sophisticated technical specifications including: work on industry-standard specifications for digital content processing and security; and the design and development of consumer electronics products and devices, including hardware DVD players, web-based content delivery services, and the integration and licensing of third-party software packages, technologies, and associated technical specifications.

6. I have seventeen issued and pending United States Patents, many of which involve digital content protection and consumer products. I was a founding member of the Digital Watermarking Alliance, an industry trade group for digital watermarking, and I have spoken extensively at trade shows and other professional venues on content security.

7. I have previously testified in three cases regarding web-based content delivery, circumvention, and related technology: *Disney Enterprises, Inc. v. VidAngel, Inc.*, No. 2:16-CV-04109-AB-PLA (C.D. Cal. 2017); *Two-Way Media Ltd. v. Comcast Cable Communications, LLC*, No. 1:14-cv-01006-RGA (D. Del. 2016); and *RealNetworks, Inc. v. DVD Copy Control*

*Association, Inc.*, Nos. C 08-04548 MHP, C 08-04719 MHP (N.D. Cal. 2009). I also testified in an arbitration as an expert on the online video industry on behalf of NBC Universal and Hulu.

8. This declaration is based upon my professional experience with computer software, computer networking systems, and various content protection technologies, as well as my own independent analysis and evaluation of Defendant's Websites, source code of Defendant's Websites produced by Defendant, Plaintiffs' records of stream-ripping on Defendant's Websites, and other available information.<sup>1</sup>

9. This declaration is geared to a general audience. Although I could provide a declaration in more precise technical terms, I assume that this level of detail is more useful to the Court.

### ***YouTube***

10. YouTube is a widely popular online streaming service that provides audio/video content for users to view, upload, search, and share. YouTube provides a wide variety of video content, but music videos make up a vast portion of the most-viewed videos. The music videos on YouTube include commercialized videos published by recording artists and commercial entities (such as record labels), as well as videos uploaded by private individuals using commercialized sound recordings as the audio track. Often YouTube may have multiple music videos containing the same sound recording.

11. Each streaming video on YouTube has a unique "watch-page" URL, which identifies the specific video on the YouTube site. Each watch page contains a media player authorized by YouTube to play the video on the page. Each watch page also has underlying source code that directs the browser in presenting all the page's components, including the

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<sup>1</sup> Documents cited in this declaration are provided with the Declaration of Kellyn M. Goler. A detailed list of the materials I have reviewed and relied upon is included with my expert report.

process by which the player accesses and plays media files from YouTube's servers using an authorized YouTube player.

12. YouTube is primarily a streaming service. The music videos on YouTube can be listened to and viewed by users while they are connected to the internet, but the transmission of those videos does not result in a permanent copy of the music video or just the audio portion of the music video for subsequent, offline access by the user.

13. YouTube's standard service and Terms of Service do not allow users to download and make copies of videos without authorization or permission.<sup>2</sup> YouTube's Terms of Service also prohibit YouTube users from other activities, including circumventing, disabling, or otherwise interfering with YouTube's features that prevent or restrict the copying or other use of content.<sup>3</sup> Apart from a premium service requiring a monthly fee payment, YouTube is a streaming service only.<sup>4</sup>

14. YouTube protects its content against unauthorized access and copying by implementing a multi-faceted system of technological mechanisms that an ordinary user would not know how to circumvent or otherwise bypass. Those technological protective mechanisms include: (a) requiring a user to watch a video on a YouTube watch page, where an authorized YouTube media player is used to play a video; (b) providing no "download" button on the YouTube watch page; (c) not permitting the user to use a "right-click" menu option to download the video file or to access or copy the video-file or any media-file URL from the player within the YouTube watch page; (d) not providing direct links to the media-file URLs of a watch page;

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<sup>2</sup> See, e.g., Ex. 2, YouTube, "Terms of Service," <https://www.youtube.com/static?template=terms> (last visited June 15, 2021).

<sup>3</sup> *Id.*

<sup>4</sup> Ex. 36, YouTube, "YouTube Premium," <https://www.youtube.com/premium> (last visited June 15, 2021). However, even with this premium service, users can only view and listen to content using YouTube apps, and downloaded content can be accessed only through these YouTube apps and only for a limited time.

and (e) presenting the user with a series of technical obstacles in accessing and using the media-file URLs for a YouTube watch page, including accessing and analyzing the source code for the watch page, identifying the appropriate media-file URLs within the source code, using an HTML decoding program or site to yield a download of the desired media file, and performing these steps before the expiration of the media-file URL.

15. For Plaintiffs' copyrighted sound recordings and likely other licensed content, YouTube provides an additional technological mechanism that protects against unauthorized access to and copying of copyrighted content. This additional protection is sometimes referred to as the "rolling cipher." YouTube's rolling cipher further protects against even technically adept users who are able to access the media-file URLs through reverse-engineering the information from the YouTube source code. For videos with this additional layer of protection, the media-file URL is missing a necessary "sig" value (a long alphanumeric string), or signature, and a "signatureCipher" parameter is added. When one of these protected videos is viewed in the normal operation of YouTube, additional components of the watch page will perform cryptographic processing to arrive at a valid signature to append to the media-file URL. This processing involves a proprietary method developed and applied by YouTube so that even a skilled user cannot "simply" use media-file URLs copied from the source code of the watch page. Rather, the user's browser must use an authorized YouTube media player to access the audio- and video-file URLs and to display the video because this authorized media player contains the necessary tools to identify and unscramble the rolling cipher.

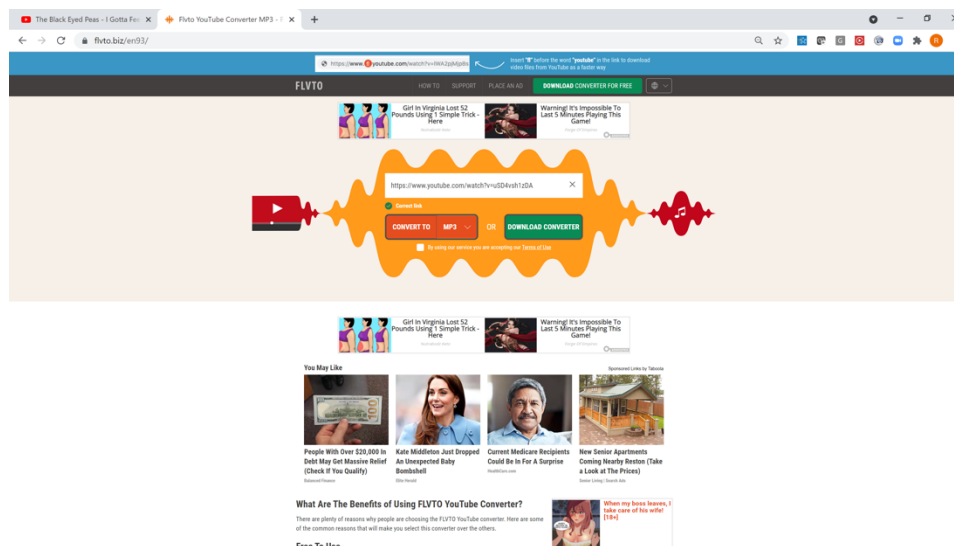
16. As a result of YouTube's technological protective mechanisms described above, an ordinary internet user is unable to create a permanent download of a sound recording streamed on YouTube. This is a key reason why websites such as Defendant's exist—to provide

a quick and easy tool for the ordinary user to obtain a permanent downloadable copy of commercialized copyrighted music.

### *Design and Operation of Defendant's Websites*

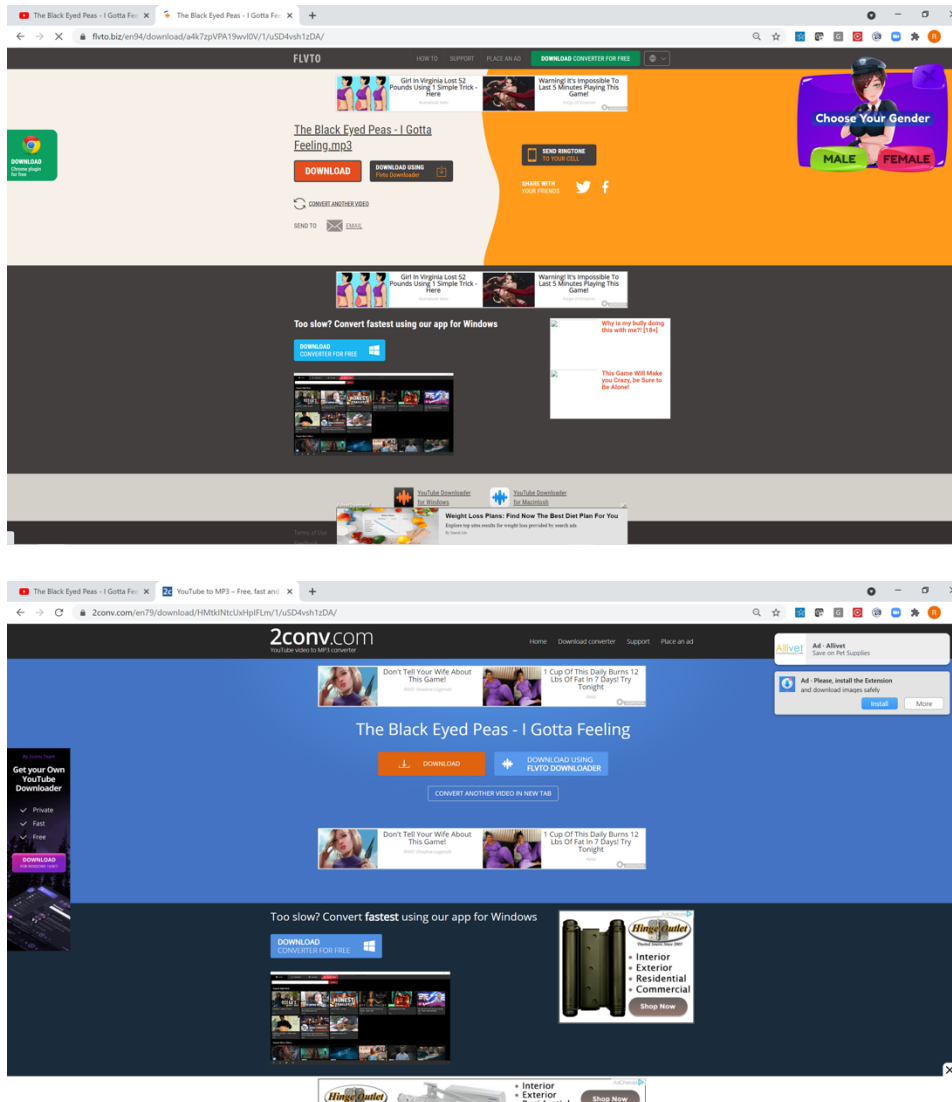
17. Defendant's Websites are tools for converting (i.e., stream-ripping) content from third-party streaming services, including YouTube, to unprotected permanently stored audio (and other media) files that can be further distributed and downloaded to users. Anyone with Internet access can download copies of commercialized sound recordings from Defendant's Websites with a few simple mouse clicks. A user does not need to register, log in, or pay to download music from the sites. Nor does the user need to have any knowledge of web programming or other special technical skills.

18. The homepages of each of Defendant's Websites feature a "converter" tool and tout the simplicity and ease of "converting streaming videos" from third-party streaming platforms, including YouTube, to audio files that the user can download. Below are screenshots of the homepages of the FLVTO Site and the 2conv Site.





19. To use either of Defendant’s Websites, a user can stream-rip an audio file from a YouTube music video in four simple steps: (1) enter the watch-page URL of a desired video on YouTube into a text-entry box prominently displayed on the homepage, (2) check a box to indicate agreement to the site’s terms of use, (3) click on a “convert” button, and (4) after the page changes, in a matter of seconds, click on a “download” button or link for an MP3 file of the audio portion of the desired video. When the user clicks on the download link, the MP3 file downloads from the Defendant’s Websites’ server to the user’s computer and is distributed to the user’s computer. Below are screenshots of the pages from each site presenting buttons to download MP3 files of “I Gotta Feeling” as performed by The Black Eyed Peas.



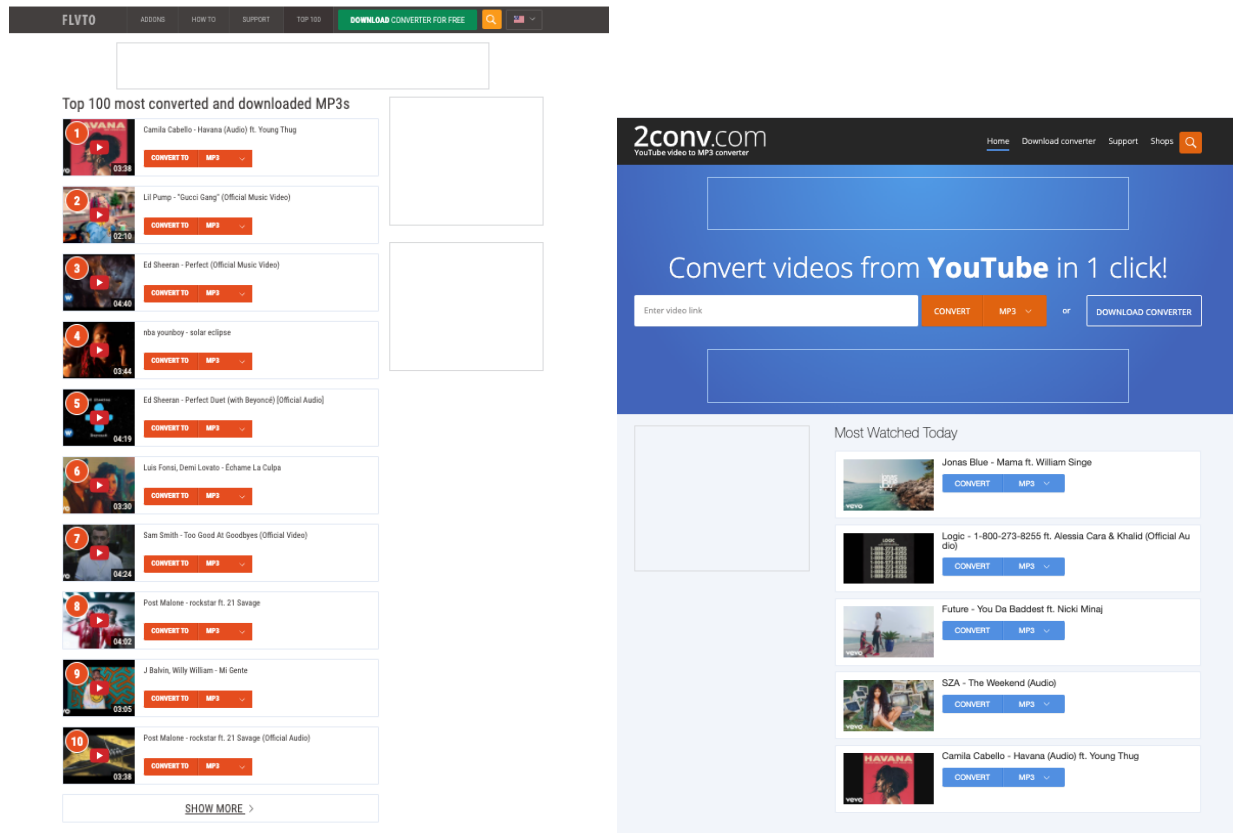
20. While the webpages of Defendant’s Websites have changed over time, the focus of Defendant’s Websites has always been music and specifically encouraging users to download free copies of commercialized sound recordings, such as Plaintiffs’ copyrighted works.

21. In the past, the FLVTO Site provided lists of the “Top 100 most converted and downloaded MP3s.”<sup>5</sup> Similarly, the 2conv Site provided lists of the videos “Most Watched

<sup>5</sup> Ex. 9, www.flvto.biz, “Top 100 most converted and downloaded MP3s,” *available at* <https://web.archive.org/web/20171215045600/www.flvto.biz/top100> (dated Dec. 15, 2017); Ex. 10, www.flvto.biz, “Top 100 most converted and downloaded MP3s,” *available at* <https://web.archive.org/web/20170830210848/http://www.flvto.biz/top100/> (dated Aug. 30, 2017); Ex. 11, www.flvto.biz, “Top 100 most converted and downloaded MP3s,” *available at* <https://web.archive.org/web/20170119082522/http://www.flvto.biz/top100/> (dated Jan. 19, 2017).



Today.”<sup>6</sup> Both lists provided direct links to convert the videos to MP3 files. As shown in the screenshots below, those lists primarily featured music videos of commercialized music, such as Plaintiffs’ copyrighted sound recordings.



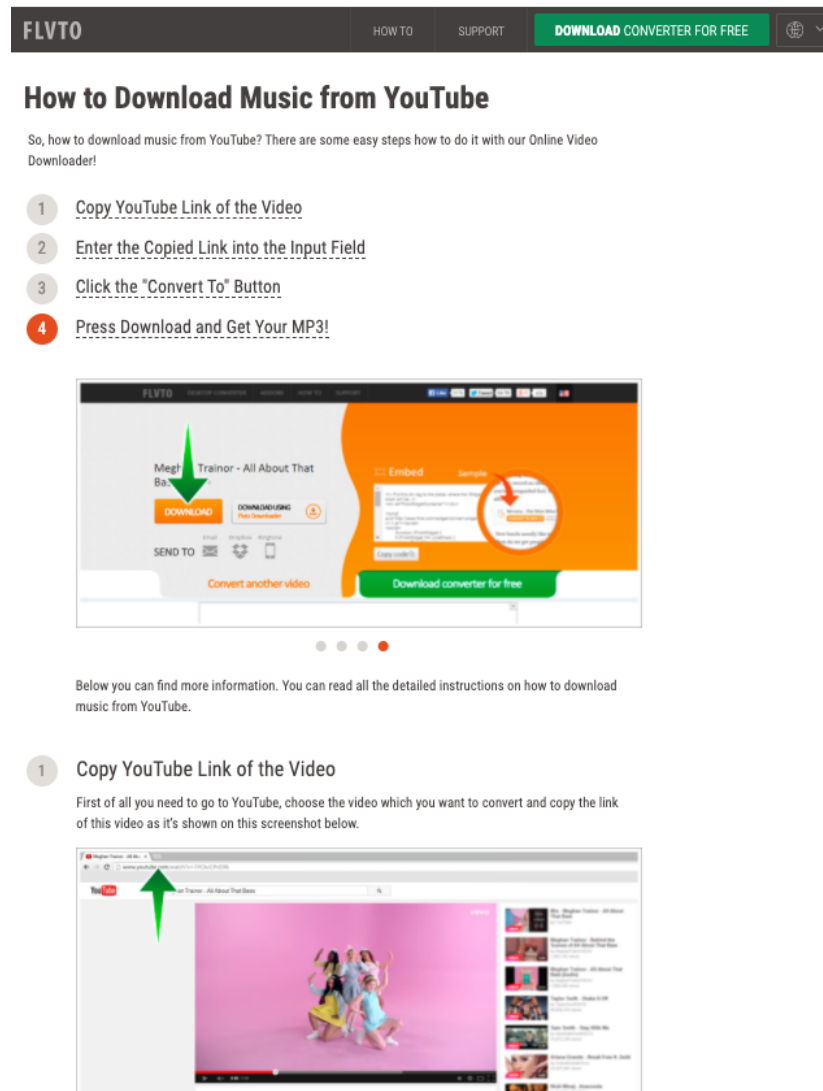
22. Defendant’s Websites promoted themselves as tools to “download music” or “songs,” to obtain copies of “the most popular music,” and to “expand [users’] music library.”<sup>7</sup>

23. Defendant’s Websites provided tutorials with step-by-step instructions on what to rip and download, often using popular music videos, such as Plaintiffs’ copyrighted sound

<sup>6</sup> Ex. 12, [www.2conv.com](http://www.2conv.com), “Most Watched Today,” available at <https://web.archive.org/web/20170822125223/http://2conv.com/> (dated Aug. 22, 2017).

<sup>7</sup> Ex. 15, [www.flvto.biz](http://www.flvto.biz), “How to Download Music for Free on Your Computer,” available at <https://web.archive.org/web/20210116215050/https://www.flvto.biz/en83/how-to/how-to-download-songs-from-youtube-to-your-computer/> (dated Jan. 16, 2021); Ex. 16, [www.2conv.com](http://www.2conv.com), “2CONV YouTube to Mp3,” available at <https://web.archive.org/web/20210301070359/https://2conv.com/en68/youtube-mp3/> (dated Mar. 1, 2021).

recordings, as examples.<sup>8</sup> Below is an excerpt of a screenshot of the FLVTO Site providing instructions on how to download music from the YouTube music video of Megan Trainor’s “All About That Bass.”



24. I have reviewed the source code that Defendant produced in this matter. It consists of software that creates and provides the webpages on Defendant’s Websites with which the user interacts, as well as implements the back-end process on Defendant’s servers associated

<sup>8</sup> Ex. 13, [www.flvto.biz](http://www.flvto.biz), “How to Download Music from YouTube,” available at <https://web.archive.org/web/20180108074253/http://www.flvto.biz/how-to/how-to-download-music-from-youtube/> (dated Jan. 8, 2018).

with the websites. Source code consists of a series of instructions that direct a computer to perform a particular sequence of operations. The functionality of the FLVTO and 2conv Sites is substantially identical.

25. It is common for the source code for a website to call upon third-party components that may either exist as software running locally on the website server (or another server operating under the control of the website operator) or as remote services accessed over the internet. In the latter case, the service is accessed through what is known as an application programming interface (“API”).

26. Defendant’s server performs the following key steps to stream-rip an audio file from YouTube: (1) run a third-party software known as youtube-dl (available at <https://youtube-dl.org>) to download a media file from YouTube; (2) convert the requested video’s audio track into an MP3 file; (3) use the API of a site known as Last.fm (available at <https://www.last.fm>) to identify metadata pertinent to the audio track; (4) add any metadata obtained from Last.fm to the MP3 file; and (5) provide a download link to the user. Upon display of the download link, the user may then click that button to obtain the ripped MP3 file from a server controlled by Defendant. Steps 1 through 4 are not necessarily repeated in the event the user enters a YouTube watch-page URL that has been entered in the past by the same user or even a different user.

27. Defendant’s source code uses the youtube-dl program to circumvent YouTube’s technological protective measures. I also understand that Defendant has stated that Defendant’s Websites use the youtube-dl software to convert video streams from YouTube and other sites into downloadable audio files.<sup>9</sup>

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<sup>9</sup> Ex. 8, Defendant’s Answers to Plaintiffs’ First Set of Interrogatories, Response to Interrogatory No. 11, at 5 (dated May 7, 2021).

28. GitHub, a company headquartered in San Francisco, operates a site on which the youtube-dl program is maintained and regularly updated. Since October 2017, there have been more than 200 updates to the youtube-dl program. As YouTube continuously updates and changes its rolling cipher technology, downloading and use of the youtube-dl updates is necessary for Defendant's Websites to effectively stream-rip YouTube audio files.

29. When Defendant's server executes the youtube-dl program to acquire the YouTube media file, it provides the requested YouTube watch-page URL to the youtube-dl program as input. The youtube-dl program then retrieves the source code for the watch-page URL and parses that source code to extract the key data it needs to access the protected YouTube content. I have reviewed certain portions of the source code for the youtube-dl program and observed that the source code performs additional steps that correspond to those necessary to decrypt the rolling cipher to obtain a functioning media-file URL. When I directly used the youtube-dl software and debugging statements from the software, I observed how youtube-dl processed YouTube videos protected by the rolling cipher differently than videos not protected by the rolling cipher.

***Extent of Infringement and Circumvention by Defendant's Websites***

30. As discussed above, Defendant's Websites are built and operate to provide free copies of downloadable files of copyrighted music. Defendant's Websites are among the most-visited websites in the world, and, from October 2017 to May 2021, over 300 million U.S. users have accessed Defendant's Websites.<sup>10</sup>

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<sup>10</sup> Ex. 19, Declaration of Tofig Kurbanov in Support of Motion to Dismiss (dated Oct. 1, 2018), at ¶¶ 35–40, Ex. 2–3; Ex. 20, SimilarWeb, "Website Analysis flyto.biz May 2018 – May 2021," at 2; Ex. 21, SimilarWeb, "Website Analysis 2conv.com May 2018 – May 2021," at 2.

31. I understand that Plaintiffs collected evidence of Defendant's stream-ripping of the 1,618 works-in-suit. I understand, for each of the works-in-suit, Plaintiffs' investigator used a YouTube watch-page URL and obtained an MP3 file stream-ripped by, and downloaded from, the FLVTO Site and/or the 2conv Site. For some works-in-suit, Plaintiffs collected a screenshot of the YouTube watch page, a screenshot of the FLVTO Site or the 2conv Site webpage presenting a link to download from the site an MP3 file of the soundtrack of the desired video, log files showing the "convert" request, and content identification by a third-party service called Audible Magic. For other works-in-suit, Plaintiffs collected videos capturing the FLVTO Site or the 2conv Site as it progressed from the "convert" request to the "download" request, as well as Audible Magic content identifications.

32. The Plaintiffs' evidence that I have reviewed is consistent with the analyses I have conducted and described above, including the operation of Defendant's Websites.

33. The Plaintiffs' evidence that I have reviewed is only illustrative of the extensive piracy on Defendant's Websites. I understand that Plaintiffs requested, and the Court ordered, the production of Defendant's web server data, and other records, reflecting the "convert" and "download" requests. I submitted an expert declaration explaining how web server data is generated and can be used to identify additional instances of stream-ripping of Plaintiffs' copyrighted sound recordings with Defendant's Websites.<sup>11</sup> I understand that Defendant failed to produce the Court-ordered information.

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<sup>11</sup> Ex. 33, Declaration of Robert W. Schumann (dated June 16, 2021), ECF No. 99-6.


### *Defendant's Domain Names*

34. Every website has a domain name that is associated with a physical IP address on the internet and that is used to access the website. A domain name has multiple levels of hierarchy, with every level separated by a dot and potentially different entities managing every level. The domain names of Defendant's Websites are flvto.biz and 2conv.com, with .biz and .com as the top-level domains. An in-depth overview of how domain names are registered is available at <https://whois/icann.org/en/domain-name-registration-process>.

35. A registry is the entity responsible for maintaining the records of domain names registered under a top-level domain. A registry's responsibilities include accepting domain name registration requests and changes from registrars, maintaining a database of registration data associated with domain names, and publishing corresponding updates to the Domain Name System (DNS), which acts as the global lookup mechanism for converting domain names to IP addresses. The registry effectively acts as the wholesaler for the domain names under its top-level domain. A registry can help effectuate transfers of domain names from one registrar to another by changing the registrar of record to a holding account for the new registrant with the new registrar. Registry Services, LLC, which is a subsidiary of GoDaddy Inc., an American company headquartered in Tempe, Arizona administers the .biz domain, and Verisign, Inc., an American company headquartered in Reston, Virginia administers the .com domain.

36. A registrar is responsible for registering domain names under the policy set by the registry and operates as the retailer interacting with the registrants of the domain names. Registrars also often contract with resellers who directly interact with end licensees. Domain names are registered to registrants for a specific time period, and are subject to stringent licensing agreements. Among other functions, registrars can, upon request, transfer a domain

name from one registrant to another. The domain names flvto.biz and 2conv.com currently are registered with the registrar Realtime Register B.V., a company based in the Netherlands.<sup>12</sup>



Robert W. Schumann

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<sup>12</sup> Ex. 39, Whois Record for flvto.biz (dated Oct. 1, 2021); Ex. 40, Whois Record for 2conv.com (dated Oct. 1, 2021).